

SURB ZP-6WR4



Product Feature

- ◆ Ultra-wide 4:1 Input voltage range
- ◆ Operating ambient temperature range: -40°C - +85°C
- ◆ Isolation voltage: 1600VDC
- ◆ High efficiency: 87% (Typ.)
- ◆ Output short-circuit protection, over-current protection, and over-voltage protection mechanisms.
- ◆ Application areas: Industry, Power, Instrumentation, Communication, Rail transit.



Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency ^② (%)	Capacitive Load (μF)
		Nominal (Range)	Max. ^①	Voltage (VDC)	Current (mA) Max.		
EN	SURB 1203 ZP-6WR4	12 (4.5-18)	20	3.3	1500	84	1800
	SURB 1205 ZP-6WR4			5	1200	84	1200
	SURB 1206 ZP-6WR4			6	1000	84	1000
	SURB 1209 ZP-6WR4			9	667	84	1000
	SURB 1212 ZP-6WR4			12	500	84	470
	SURB 1215 ZP-6WR4			15	400	84	220
	SURB 1218 ZP-6WR4			18	333	84	150
	SURB 1224 ZP-6WR4			24	250	85	100
	SURB 2403 ZP-6WR4	24 (9-36)	40	3.3	1500	85	1800
	SURB 2405 ZP-6WR4			5	1200	85	1200
	SURB 2406 ZP-6WR4			6	1000	85	1000
	SURB 2409 ZP-6WR4			9	667	85	1000
	SURB 2412 ZP-6WR4			12	500	86	470
	SURB 2415 ZP-6WR4			15	400	86	220
	SURB 2418 ZP-6WR4			18	333	86	150
	SURB 2424 ZP-6WR4			24	250	87	100
	SURB 4803 ZP-6WR4	48 (18-75)	80	3.3	1500	86	1800
	SURB 4805 ZP-6WR4			5	1200	86	1200
	SURB 4806 ZP-6WR4			6	1000	86	1000
	SURB 4809 ZP-6WR4			9	667	86	680
	SURB 4812 ZP-6WR4			12	500	86	470
	SURB 4815 ZP-6WR4			15	400	86	220
	SURB 4818 ZP-6WR4			18	333	86	150
	SURB 4824 ZP-6WR4			24	250	87	100

Note:

①. Exceeding the maximum input voltage may cause permanent damage;

②. Efficiency is measured at nominal input voltage and rated output load.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (Full Load/No-Load)	12VDC Nominal input series, nominal input voltage	3.3V Output	--	491/5	503/10	mA
		Others output	--	595/20	610/35	
	24VDC Nominal input series, nominal input voltage	3.3V Output	--	243/5	248/8	
		Others output	--	294/10	301/20	
	48VDC Nominal input series, nominal input voltage	3.3V Output	--	120/3	123/5	
		Others output	--	145/8	149/12	
Reflected Ripple Current	Nominal input series		--	30	--	
Surge Voltage (1sec. max.)	12VDC Nominal input series		-0.7	--	25	VDC
	24VDC Nominal input series		-0.7	--	50	
	48VDC Nominal input series		-0.7	--	100	
Start-Up Voltage	12VDC Nominal input series		--	--	4.5	
	24VDC Nominal input series		--	--	9	
	48VDC Nominal input series		--	--	18	
Input Under-Voltage Protection	12VDC Nominal input series		3.5	4	--	
	24VDC Nominal input series		5.5	6.5	--	
	48VDC Nominal input series		12	15.5	--	
Input Filter			PI filter			
Hot Plug			Unavailable			

Output Specification

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	0%-100% load		--	±1.0	±3.0	%
Linear Regulation	Vin=Min. to Max. @Full Load		--	±0.2	±0.5	
Load Regulation	5%-100% load		--	±0.5	±1.0	
	0%-100% load		--	±1.0	±3.0	
Ripple & Noise ^①	20MHz bandwidth,100% load,parallel cable method		--	40	80	mVp-p
Transient Recovery Time	25% Load step change,nominal input voltage		--	300	500	μs
Transient Response Deviation	25% Load step change, nominal input voltage	3.3/5/6V Output	--	±5.0	±8.0	%
		Others output	--	±3.0	±5.0	
Temperature Coefficient	Full load		--	--	±0.03	%/°C
Over-Voltage Protection	Input voltage range		110	--	160	%Vo
Over-Current Protection			110	160	--	%Io
Short-Circuit Protection			Continuous,Self-Recovery			
Note: ①. Under 0%-5% load conditions,ripple & noise does not exceed 5%Vo.						

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, test time 1 minute, leakage current less than 1mA	1600	--	--	VDC
Insulation Resistance	Input-output, resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	--	2200	--	pF
Operating Temperature	See Fig. 1	-40	--	+85	°C
Storage Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
Soldering Profile	Wave-soldering	260±5°C; time:5 - 10s			
	Manual-welding	360±10°C;time:3 - 5s			
Switching Frequency	PWM	--	300	--	kHz
Vibration		IEC/EN 61373 -Category 1,Grade B			
MTBF	MIL-HDBK-217F@25°C	1000	--	--	k Hours

Mechanical Specifications

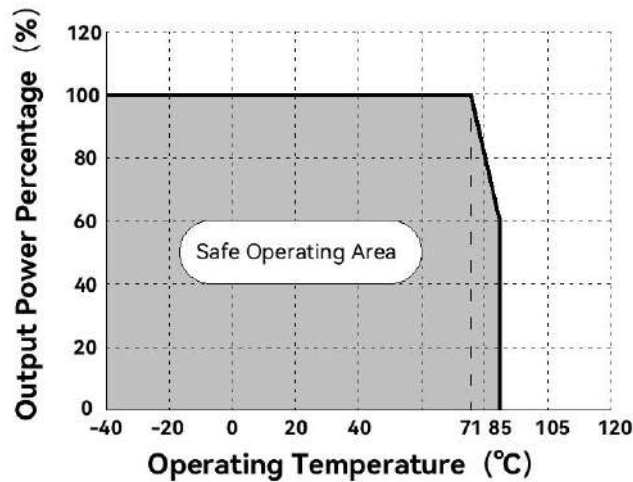
Case Material	Aluminum alloy
Package Dimensions	32.00×20.00×11.10mm
Weight	12.0g (Typ.)
Cooling Method	Free air convection

EMC Specifications

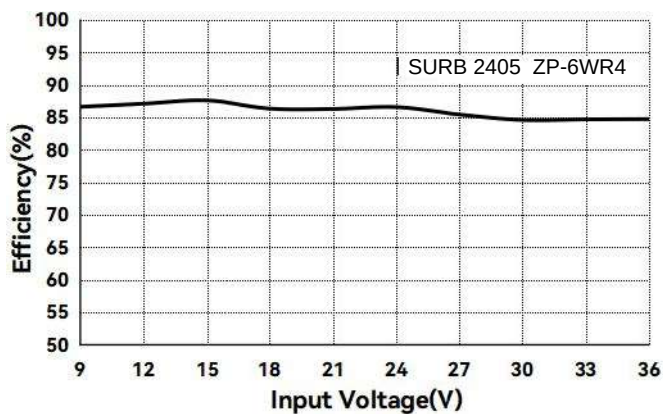
EMI	CE	CISPR32/EN55032 CLASS B (see Fig. 3-② for recommended circuit)			
	RE	CISPR32/EN55032 CLASS B (see Fig. 3-② for recommended circuit)			
EMS	ESD	IEC/EN61000-4-2 Contact ±4KV			Perf.Criteria B
	RS	IEC/EN61000-4-3 10V/m			Perf.Criteria A
	EFT	IEC/EN61000-4-4 ±2KV (see Fig. 3-① for recommended circuit)			Perf.Criteria B
	Surge	IEC/EN61000-4-5 line to line ±2KV (see Fig. 3-① for recommended circuit)			Perf.Criteria B
	CS	IEC/EN61000-4-6 3Vr.m.s			Perf.Criteria A

Typical Characteristic Curves

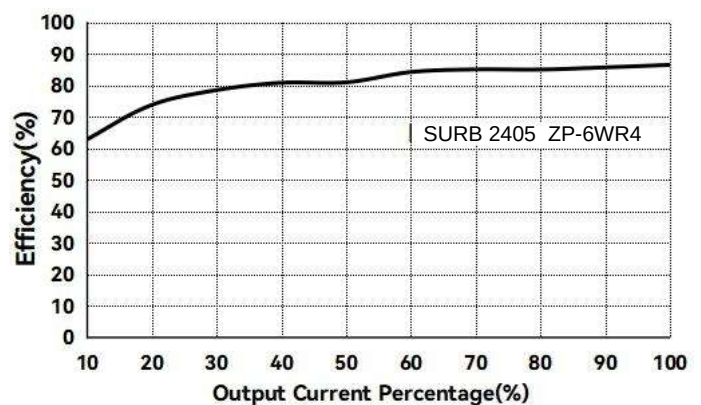
Temperature Derating Curve (Fig. 1)



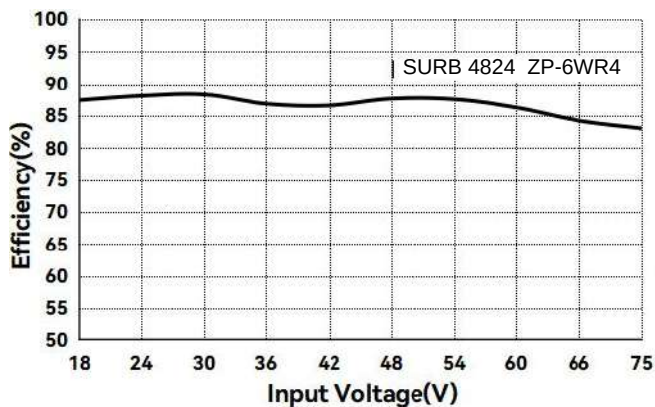
Efficiency VS Input Voltage (Full load)



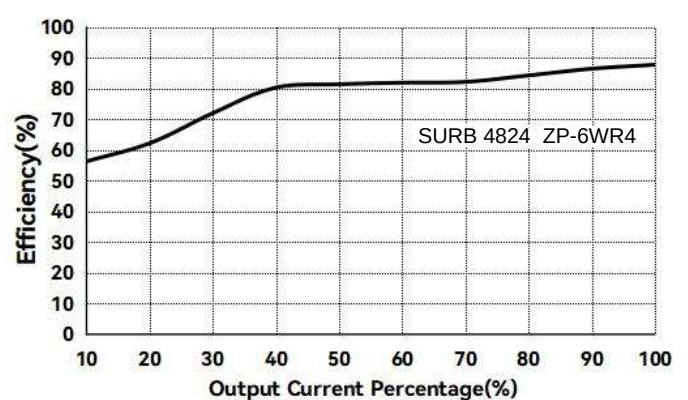
Efficiency VS Output Load (Vin=24V)



Efficiency VS Input Voltage (Full load)



Efficiency VS Output Load (Vin=48V)



Typical Circuit Design And Application

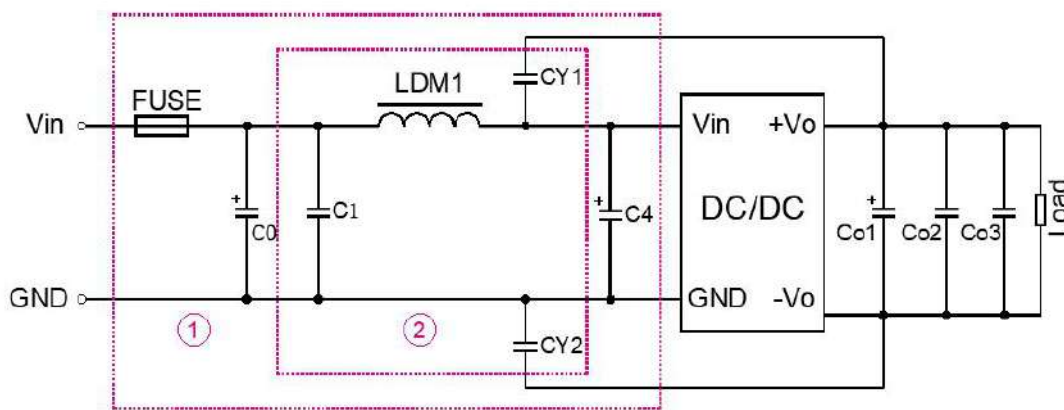
Recommended Circuit (Fig. 2)

Recommended Capacitive Load Value Table

Vout	C1	Co1	Co2	Co3
3.3/5/6VDC	100μF/100V	47μF/16V	10μF/50V	0.1μF/16V
9/12/15VDC	100μF/100V	47μF/25V	10μF/50V	0.1μF/25V
18/24VDC	100μF/100V	47μF/50V	10μF/50V	0.1μF/50V

All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values C_1 and $C_{o1}/C_{o2}/C_{o3}$ and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

EMC Recommended Circuit (Fig. 3)



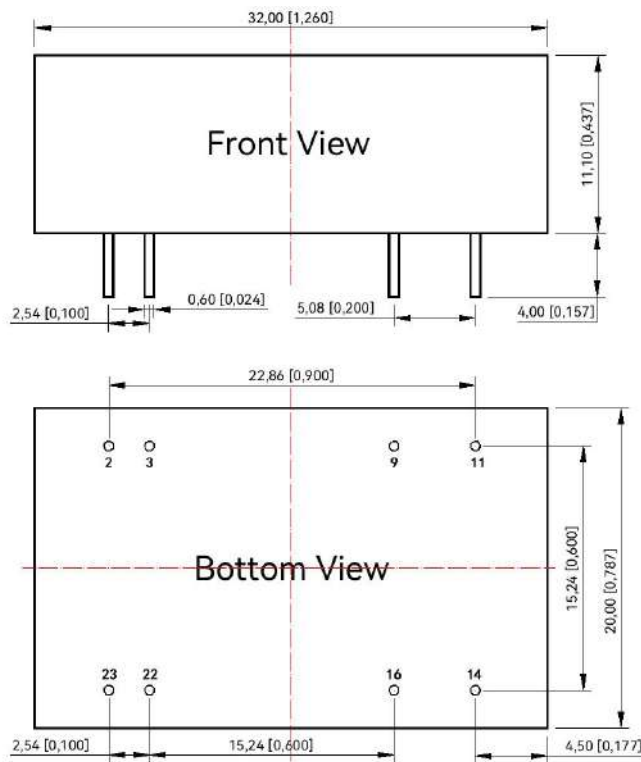
Notes: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

EMC Recommended Parameter Table

Model	Vin:12VDC	Vin:24VDC	Vin:48VDC
FUSE	Select according to the actual input current of the customer		
C0,C4	330μF/50V		330μF/100V
C1	4.7μF/50V		4.7μF/100V
LDM1	10μH		
Co1,Co2,Co3	Refer Fig. 2 Capacitive load value table		
CY1,CY2	1nF/2kVDC		

Dimensions and Recommended Layout

Dimensions



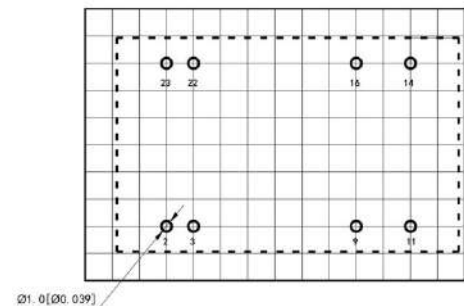
Note:

Unit: mm[inch]

Pin section tolerances: $\pm 0.10 [\pm 0.004]$

General tolerances: $\pm 0.50 [\pm 0.020]$

PCB Printing Layout



The grid distance is 2.54mm x 2.54mm

Pin Definition Table

Pin	Single
2,3	GND
9	No pin
11	NC
14	+Vo
16	-Vo
22,23	Vin
NC: Pin to be isolated from circuit	

Packaging Instructions

Packaging Information

Product quantity (pcs/tube)	Electrostatic bag quantity (pcs/bag)	Inner carton quantity (pcs/carton)	Outer carton quantity (pcs/carton)
16	80	320	1280

Note:

- ✧ The input voltage should not exceed the specified range value, otherwise it may cause permanent and irreparable damage;
- ✧ It is recommended to use at a load of over 5%. If the load is below 5%, the ripple index of the product may exceed the specifications, but it does not affect the reliability of the product;
- ✧ The maximum capacitive load is tested within the input voltage range and under full load conditions;
- ✧ Unless otherwise specified, all indicators in this manual are measured at $T_a=25\text{ }^{\circ}\text{C}$, humidity<75% RH, nominal input voltage, and output rated load;
- ✧ All indicator testing methods in this manual are based on our company's corporate standards;
- ✧ Our company can provide product customization, and specific requirements can be directly contacted by our technical personnel;
- ✧ Product specifications are subject to change without prior notice.